STUDY OF STABILITY OF FLYASH DAM USING SLIDE SOFTWARE

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ABSTRACT

The main aim of our study is to analyse the stability of slope instantly and to avoid tiresome calculation used in traditional method and to save time using computer software and application (SLIDE). And we have also tried to aware the use of fly ash for the preparation of dam which is just been wasted. The stability analysis of various slopes is very tiresome and time consuming effort, though due to various efforts we cannot analyse numbers of models due to restriction of time and large and monotonous calculation which are used in analysis by traditional method. Thus, emphasize by us is made on use of computer software and application for the stability analysis, which give results in couple of seconds and we have option of number of models and the best suited for us can be selected.

KEYWORDS: earthen dam, fly ash dam, stability, factor of safety, slide software.

INTRODUCTION

Emphasize has also been made on use of fly ash in the construction of dam, as in the present scenario where the ash generated from thermal power plants and others plants are used to a very less extent approx 40-50% and the other ash is been just dumped of in the ash ponds. So we have emphasize use of fly ash which is just been wasted.

Slide is the most comprehensive slope stability analysis software available, complete with finite element groundwater seepage analysis, rapid drawdown, sensitivity and probabilistic analysis, and support design. All types of soil and rock slopes, embankments, earth dams, and retaining walls can be analyzed.

Slide is the only slope stability software with built-in finite element groundwater seepage analysis for steady-state or transient conditions. Flows, pressures and gradients are calculated based on user defined hydraulic boundary conditions.

Slide has extensive probabilistic analysis capabilities - you may assign statistical distributions to almost any input parameters, including material properties, support properties, loads, and water table location. The probability of failure/reliability index is calculated, and provides an objective measure of the risk of failure associated with a slope design. Sensitivity analysis allows you to determine the effect of individual variables on the safety factor of the slope

The geotechnical engineer frequently uses limit equilibrium methods of analysis when studying slope stability problems. The methods of slices have become the most common methods due to their ability to accommodate complex geometrics and variable soil and water pressureconditions (Terzaghi and Peck 1967). During the past three decades many methods of slices havebeen developed (Wright 1969). They differ in (i) the statics employed in deriving the factor of safety equation and (ii) the assumption used to render the problem determinate (Fredlund 1975).

The numerous approaches to slope stability analysis can be categorized as either

1) Limit (plasticity-type)formulation or
2) Displacement formulations such as finite element method (Wroth,1976).

This chapter includes six of the most commonly used limit equilibrium methods:

Limit formulations provide a theoretical context for understanding the range of answers that can be expected from a slope stability analysis (Mendelson,1968) .These formulations are referred to as upper and lower bound solutions. The method of characteristics for stresses is an example of a lower bound solutions. The method of characteristics for displacements is an example of an upper bound solution. The commonly used limit equilibrium methods are an upper bound solution.

1. Fellenius method (sometimes referred to as the Swedish circle method or the conventional method)
2. Simplified Bishop Method
3. Spencer's Method
4. Janbu's Simplified Method
5. Morgenstern-Price Method.

TABLE 1: VARIOUS MODELS WITH SLOPES,UNIT WEIGHT, ANGLE OF FRICTION OF FLY ASH WITH FOS

Sr. No.	Height (meter)	Slopes	Unit weight (kN/m^3)	Angle of friction(°)	Factor of safety
1	5	1:1.5	13	30	0.946
2	5	1:2	13	30	1.244
3	5	1:2.5	13	30	1.544
4	8	1:1.5	13	30	0.929
5	8	1:2	13	30	1.225
6	8	1:2.5	13	30	1.523
7	10	1:1.5	13	30	0.923
8	10	1:2	13	30	1.217
9	10	1:2.5	13	30	1.514

The graphical representation of various models shown in the above table are represented below.

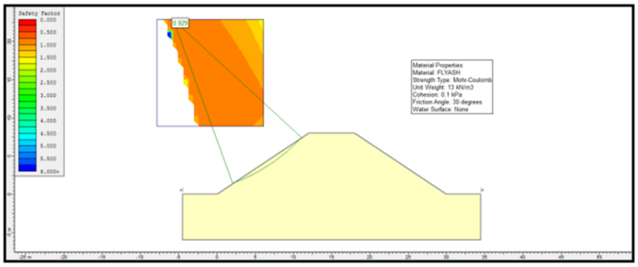

Fig.:1 :FLY ASH DAM WITH H=5M,S=1:1.5

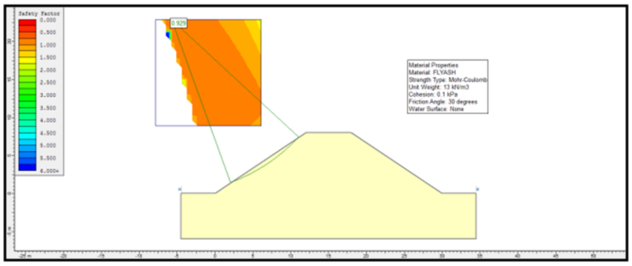

Fig.:2 :FLY ASH DAM WITH H=8M,S=1:1.5

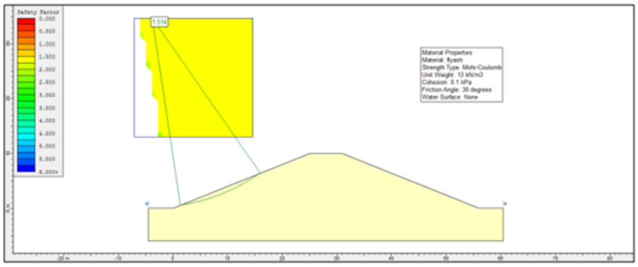

Fig.:3 :FLY ASH DAM WITH H=10M,S=1:2.5

CASE STUDY

The values of unit weight is taken as (13,15,17) in kN/m^3 , and angle of friction is taken as (30,32,34) in degree and height is taken as (5,8,10) in meter, and the slope for each height is taken as (1:1.5,1:2,1:2.5). And cohesion is kept constant 0.1 kN/m^2.

81 simple models of fly ash as material had been made by us by varying various parameters. Out of which some of the simple models had been demonstrated below.

CONCLUSIONS]

Thus with the study of our research we can conclude that the use of software application makes the work done very rapidly. A model can be analysed within couple of second and reduces the tiresome effort required for calculation and other study required in conventional method.

We would also like to emphasize on the use of fly ash dam as the various models studied by us on fly ash dam gives better FOS. So we can conclude that fly ash can also be used in construction of dam

REFERENCES:

1. Panda A. K. and Viswanathan G. (1999), "Fly Ash Utilization in Construction of Ash Ponds", Fly Ash Disposal and Deposition: Beyond 2000 AD.
2. Venkatachalam K., Khitoliya R. K., Chitra R. and Sen Purbi (1999), "Safe Disposal of Fly Ash and Its Applications as Construction and Fill Material", Fly Ash Disposal and Deposition: Beyond 2000 AD.
3. Rengaswamy A. and Mohan Kumar (1999), "Ash Pond Lining", Fly Ash Disposal and Deposition: Beyond 2000 AD.